REMARKS

Claims 1-6, 9-11, 13, 14, 17-22, and 24-41 are currently pending in the subject application and are presently under consideration. Claims 1, 10, 21 and 22-33 have been amended as shown on pages 2-10 the Reply while claims 8, 42 have been canceled. New claim 43 has been added. Support for this claim can be found in the specification as filed at page 1 lines 20-21. Applicants' representative thanks Examiner Khakhar and Examiner Lee for the teleconference of December 2, 2008 wherein merits of the claims vis-à-vis the cited references were discussed. It was indicated that the amendments overcome the rejection under 35 U.S.C. §101.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 21, 22, and 24-33 Under 35 U.S.C. §101

Claims 21, 22, and 24-33 stand rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Withdrawal of this rejection is requested in view of the aforementioned amendments to claim 21 to include computer readable storage media.

II. Rejection of Claims 1-6, 8-11, 13, 14, and 17-20 Under 35 U.S.C §112

Claims 1-6, 8-11, 13, 14, and 17-20 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Withdrawal of this rejection is requested in view of the aforementioned amendments to these claims deleting the terminology cited in the rejection.

III. Rejection of Claims 1, 6, 9-11, 13, 14, 17, and 18 Under 35 U.S.C. §103(a)

Claims 1, 6, 9-11, 13, 14, 17, and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392). Withdrawal of this rejection is requested for at least the following reasons. The cited documents alone or in combination do not teach or suggest all aspects of the subject

claims.

The claimed subject matter generally relates to a query optimization wherein a predicate component that introduces into a query an extra predicate that is used as dictated by rules and is tied to index utilization. To this end independent claim 1 recites: ***an optimizing component comprising at least a query component that receives a query to be processed against data of a non-indexable data type stored in the data repository, which query includes an original predicate, the optimizing component requests a metadata engine an implication rule for a given column comprising the non-indexable data, or for a function on the given column by sending the metadata engine an expression to which the column or the function on the column is to be compared, and a list of one or more indices that can be exploited for the comparison.*** Similarly claim 10 recites: ***an optimizing component comprising at least a query component that receives a query to be processed against data of a non-indexable data type stored in the data repository, which query includes an original predicate, the optimizing component requests a metadata engine an implication rule for a given column comprising the non-indexable data, or for a function on the given column by sending the metadata engine an expression to which the column or the function on column is to be compared, and a list of one or more indices that can be exploited for the comparison.*** The cited documents alone or in combination do not teach or suggest such claimed aspects.

In particular, Levy, et al., *et al.* relates to a method for manipulating aggregation predicates in database applications. New predicates are inferred from an initial set of predicates including the aggregation predicates in representative form. However, Levy, et al. *et al.* does not teach or suggest simplifying a search on a column comprising non-indexable data type by requesting an implication rule for a column or function of the column by transmitting an expression to which the column or function of the column is to be compared.

The secondary document IBM fails to make up for this deficiency. IBM relates to utilizing all the possible indexes on the table to check as many of the query's predicates as possible, so that the result of the query can be derived in the most efficient way. It uses index intersection for conjunctive predicates (ANDed predicates), and index union for disjunctive predicates (OR predicates). For queries with both conjunctive predicates and disjunctive predicates, index intersection and index union are both used. However, IBM does not teach or suggest conducting a search on a column comprising data of a non-indexable data type by

passing the column/function of the column, expression to be compared etc. to an entity providing the implication rule.

The features incorporated into the independent claims were previously recited in dependent claims 8, 42 both of which are now canceled. The claims were rejected as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392), further in view of Dessloch et al. (US 6,338,056). However, Dessloch et al. relates to indexing semi-structured, non-traditional data using an external search engine accessible to a database engine through a standardized interface. An external index managed by an external search engine maps object identifiers associated with the non-traditional data to row identifiers for a table stored in the relational database. In response to a query, one or more of the object identifiers are retrieved from the external index by the external search engine. The object identifiers returned by the external search engine are then used by the database engine to retrieve one or more row identifiers from an index in the relational database. The row identifiers are then used to retrieve one or more rows from the table in the relational database. (*See* Dessloch *et al.* Abstract). At the cited portion Dessloch et al. teaches a text search extension that generates keys using a Key Transformation function which returns multiple key values that cause multiple entries of row identifiers in an index (See col. 13 lines 8-13). Hence, it can be concluded that Dessloch et al. pertains to using external indices that map to row identifiers for a table comprising non-traditional data for executing queries that retrieve the non-traditional data.

In contrast, the claimed subject matter generates substitute predicates for existing predicates or implied predicates in which existing predicates are used in a manner that exploit existing indexes. In order to determine such substitute/implied predicates exploiting an index an optimization component requests for implication rules by sending to a metadata engine the expression to which a column/function of the column should be compared as well as indexes to be exploited. (*See* Fig.5 and related text of applicants' specification from page 8 line 15 – page 10 line 2). In this example, the expression transmitted is *p1* = @*p2*, and as *p1* is a non-indexable column, indices on other columns using *p1* such as indices on columns `PrfxCompCol` and `AnotherCompCol`, are transmitted as both exploit *p1*. Such claimed aspects are not taught or suggested either alone or in combination by the cited references.

In view of at least the foregoing, it is clear that none of the cited documents alone or in combination teach or suggest all aspects recited in the subject claims. Hence, withdrawal of this rejection is respectfully requested.

IV. Rejection of Claim 2 Under 35 U.S.C. §103(a)

Claim 2 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy, et al., in view of IBM, further in view of Larson, *et al.* (U.S. 6,381,616) hereafter, "Larson '616". It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 2 depends on independent claim 1. As stated *supra*, Levy, et al. , *et al.* and IBM do not teach or suggest all features of claim 1. Larson'616 relates to modifying or converting predicates involving a comparison with a string constant in a query so that the predicates can be evaluated by an external or remote source that uses a different collating sequence. But it does not makeup for the aforementioned deficiency of Levy, et al. , *et al.* and IBM with respect to independent claim 1. Therefore, withdrawal of this rejection is requested with respect to dependent claim 2.

V. Rejection of Claims 3-5 Under 35 U.S.C. §103(a)

Claims 3-5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392), further in view of Larson et al. (US 2003/0093415). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claims 3-5 and 7 depend on independent claim 1. As stated *supra*, Levy, *et al.* and IBM fail to teach or suggest all features of claim 1. Larson'415 relates a transformation-based optimizer that generates rewritings by applying local algebraic transformation rules on subexpressions of the query. Application of a transformation rule produces substitute expressions that are logically equivalent to the original expression. In particular, a view matching rule (or rules) is disclosed, which determines whether the original query can be computed from

one or more of the existing materialized views and, if so, generates substitute expressions. On pages 13 and 20 of the subject Office Action it is incorrectly contended that Larson'415 teaches transmitting an expression for comparison and one or more indices that can be exploited for the comparison in order to obtain implication rules. At the cited portion Larson'415 teaches three tests exploiting knowledge about column equivalences. The information is captured by computing a collection of equivalence classes from column equality predicates contained in the selection predicate. An equivalence class is a set of columns that are known to be equal and hence can be used inter-changeably in other predicates. However, it does not teach or suggest ***an optimizing component comprising at least a query component*** *that receives a query to be processed against data of a non-indexable data type from the data repository, which query includes an original predicate,* ***the optimizing component requests a metadata engine an implication rule for a given column comprising the data, or for a function on the given column by sending the metadata engine an expression to which the column or function on a column is to be compared, and a list of one or more indices that can be exploited*** as recited in independent claim 1. As stated *supra*, in the discussion with respect to independent claim 1 the transmission of expression for column comparison and related indices helps to determine substitute/implied predicates exploiting an index.

From the foregoing, it is clear that Larson'415 does not makeup for the aforementioned deficiency of Levy, *et al.* and IBM with respect to independent claim 1. Hence, withdrawal of this rejection is requested with respect to dependent claims 3-5 and 7.

VI. Rejection of Claims 8 and 42 Under 35 U.S.C. §103(a)

Claims 8 and 42 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392), further in view of Dessloch et al. (US 6,338,056). These claims are canceled and their features incorporated into the independent claims. Accordingly please see remarks in section III of this reply.

VII. Rejection of Claims 19, 21, 22, 32, 34, and 40 Under 35 U.S.C. §103(a)

Claims 19, 21, 22, 32, 34, and 40 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392), further in view of Lin, et al. (US 6,675,159). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

The claimed subject matter generally relates to a query optimization wherein a predicate component that introduces into a query an extra predicate that is used as dictated by rules and is tied to index utilization. To this end, independent claim 10 recites: ***an optimizing component comprising at least a query component that receives a query to be processed against data of a non-indexable data type stored in the data repository, which query includes an original predicate, the optimizing component requests a metadata engine an implication rule for a given column comprising the non-indexable data, or for a function on the given column by sending the metadata engine an expression to which the column or the function on the column is to be compared, and a list of one or more indices that can be exploited for the comparison.*** Similarly independent claim 21 recites ***requesting an implication rule for a column comprising data of a non-indexable data type or a function of the column by transmitting at least one of an expression to which the column or the function on a column is to be compared and a list of one or more standard indices or one or more multi-valued indices that could be utilized for the comparison.*** The cited documents alone or in combination do not teach or suggest such claimed aspects.

As stated *supra*, Levy, *et al.* and IBM do not teach or suggest the aforementioned claimed aspects. Larson'616 relates to modifying or converting predicates involving a comparison with a string constant in a query so that the predicates can be evaluated by an external or remote source that uses a different collating sequence. But it does not makeup for the aforementioned deficiency of Levy, *et al.* and IBM with respect to independent claim 10. On page 13 of the subject Final Office Action it is erroneously contended that the third reference Larson'415 teaches the aforementioned claimed aspects. Rather at the cited portion Larson'415 teaches gaining knowledge about column equivalences by computing a collection of equivalence classes from column equality predicates contained in the selection predicate. An equivalence class is

defined by Larson'415 as, a set of columns that are known to be equal and hence can be used inter-changeably in other predicates. However, it does not teach or suggest using implication rules and column indices to identify substitute/implied predicates as recited in the independent claim 10.

In accordance with the claimed subject matter, substitute predicates for existing predicates or implied predicates are identified or generated. In order to determine such substitute/implied predicates exploiting an index an optimization component requests for implication rules by sending to a metadata engine the expression to which a column/function of the column should be compared as well as indexes to be exploited. (*See* Fig.5 and related text of applicants' specification from page 8 line 15 – page 10 line 2). Such aspects are not taught or suggested either alone or in combination by any of the cited references and hence withdrawal of this rejection is requested.

VIII. Rejection of Claim 20 Under 35 U.S.C. §103(a)

Claim 20 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392) as applied to Claim 10, further in view of Reiner et al. (US 5,742,806). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 20 depend from independent claim 10. As stated *supra*, Levy, *et al.,* IBM, Larson'616 and Larson'415 do not teach or suggest all features of claim 10. Reiner, *et al.* relates to "query decomposition" wherein database queries are intercepted prior to processing by a database management system ("DBMS"). The system decomposes at least selected queries to generate multiple subqueries for application, in parallel, to the DBMS, in lieu of the intercepted query. Responses by the DBMS to the subqueries are assembled by the system to generate a final response (*See* Reiner, *et al.* Abstract). But it does not makeup for the aforementioned deficiency of Levy, *et al.,* IBM, Larson '616, and Larson '415 with respect to independent claim 10. Therefore, withdrawal of this rejection is requested with respect to dependent claim 20.

IX. Rejection of Claims 24, 28, 29, 38, 39, and 41 Under 35 U.S.C. §103(a)

Claims 24, 28, 29, 38, 39, and 41 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392) and Lin, et al. (US 6,675,159) as applied to Claim 21, yet further in view of Larson et al. (US 2003/0093415). It is respectfully requested that this rejection be withdrawn for at least the following reasons. Claims 24, 28, and 29 depend from independent claim 21 while claims 38, 39 and 41 depend from independent claim 34. None of the cited references alone or in combination teaches or suggests all aspects recited in the subject independent claims.

The claimed subject matter generally relates to a system that facilitates allowing a query optimizing component to infer a simple comparison on an indexed column from another predicate condition. This occurs by introducing into a query, extra predicates are used as dictated by rules that are received by the metadata component. To this end independent claims 21 and 34 recite similar features namely: ***means for requesting an implication rule for a column comprising data of a non-indexable data type or a function of the column; means for transmitting at least one of an expression to which the column or the function on the column is to be compared and a list of standard indices or multi-valued indices that could be exploited.*** As discussed *supra*, none of the cited references alone or in combination teach or suggest such claimed aspects. In view of at least the foregoing, withdrawal of this rejection is respectfully requested.

X. Rejection of Claims 25, 26, 35, and 36 Under 35 U.S.C. §103(a)

Claims 25, 26, 35, and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392) and Lin, et al. (US 6,675,159), yet further in view of Pauschine et al. (US 5,918,232). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claims 25, 26 depend from independent claim 21 while claims 35, 36 depend from independent claim 34. As stated *supra*, Levy, *et al.*, IBM, and Lin, *et al.* do not teach or suggest

all features of claim 21 and similarly claim 34. Pauschine, *et al.* relates to a system and method for computer modeling and for creating hyperstructures which are obtain measurements of physical objects and activities related to an entity to be modeled. But it does not makeup for the aforementioned deficiency of Levy, *et al.*, IBM, Larson'616 and Lin, *et al.* with respect to independent claims 21 and 34. Therefore, withdrawal of this rejection is requested with respect to dependent claims 25, 26, 35 and 36.

XI. Rejection of Claims 27, 30, and 37 Under 35 U.S.C. §103(a)

Claims 27, 30, and 37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392) and Lin, et al. (US 6,675,159), yet further in view of Paulley et al. (US 6,665,664). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claims 27 and 30 depend from independent claim 21 while claim 37 depends from independent claim 34. As stated *supra*, Levy, *et al.,* IBM, and Lin, *et al.* do not teach or suggest all features of claim 21. Paulley, *et al.* relates to query optimization techniques that selectively normalize segments of a query based on a determination of whether it is advantageous to fully convert each given segment to conjunctive normal form(CNF) (*See* Paulley, *et al.* Abstract). But it does not makeup for the aforementioned deficiency of Levy, *et al.,* IBM, and Lin, *et al.* with respect to independent claims 21 and 34. Therefore, withdrawal of this rejection is requested with respect to dependent claims 27, 30 and 37.

XII. Rejection of Claim 31 Under 35 U.S.C. §103(a)

Claim 31 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392) and Lin, et al. (US 6,675,159), yet further in view of Larson et al. (US 6,381,616). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

The claimed subject matter generally relates to a system that facilitates allowing a query optimizing component to infer a simple comparison on an indexed column from another predicate condition. This occurs by introducing into a query, extra predicates are used as dictated by rules that are received by the metadata component. To this end independent claim 21 recites: ***requesting an implication rule for a column comprising data of a non-indexable data type or a function of the column by transmitting at least one of an expression to which the column or the function on a column is to be compared and a list of one or more standard indices or one or more multi-valued indices that could be utilized for the comparison.*** The cited documents alone or in combination do not teach or suggest such claimed aspects.

As stated *supra*, Levy, *et al.* and IBM do not teach or suggest selecting predicates based on a determination of the predicates being used in an index seek operation or are covered by contents of one or more indices when running queries on non-indexable data types. Larson'616 relates to modifying or converting predicates involving a comparison with a string constant in a query so that the predicates can be evaluated by an external or remote source that uses a different collating sequence. But it does not makeup for the aforementioned deficiency of Levy, *et al.* with respect to independent claim 21.

In view of at least the foregoing, it is clear that none of the cited documents teach or suggest all aspects recited in the subject claims. Therefore, this rejection should be withdrawn with respect claim 21 and claim 31 that depends there from.

XIII. Rejection of Claims 33 Under 35 U.S.C. §103(a)

Claim 33 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levy et al. (US 6,088,524), in view of IBM ("Multiple Indexed Access Path in a Relational Database System", IBM Technical Disclosure Bulletin, March 1990 Vol. 32, Iss. 10B, pp. 388-392) and Lin, et al. (US 6,675,159), yet further in view of Leslie et al. (US 5,778,354). It is respectfully requested that this rejection be withdrawn for at least the following reasons. The cited documents alone or in combination do not teach or suggest all features recited in the subject claims.

Claim 33 depends from independent claim 21. Leslie, *et al.* relates to a database management system with a multi-dimensional indexed accessing capability using keyed index searching (*See* Leslie, *et al.* Abstract). But it does not makeup for the aforementioned deficiency

of Levy, *et al.,* IBM, and Lin, *et al.* with respect to independent claim 21. Therefore, withdrawal of this rejection is requested with respect to dependent claim 33.

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP576US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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